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ABSTRACT

An integrated data base system providing online services to purchasing and accounts payable, which was implemented at the University of Michigan, is described. The system was designed to use online IMS transactions for data entry and inquiry and IMS batch reporting programs. With the implementation of the system, departmental and vendor inquiries are answered more quickly and with greater accuracy, and invoices are paid more promptly. There is more rigorous control and application of credit memos on a university-wide basis, and the accumulation of statistical data has provided management the tools necessary to direct the efforts and measure results in purchasing and accounts payable. Duplicate files have been eliminated, and clerical effort has been substantially reduced. The security and controls built into the system have made unauthorized purchases and payments much more difficult. Data base and file descriptions and an overview of the way the system works are presented. A schematic diagram of the system is included. (SW)

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On-Line Purchasing/Accounts Payable
at
The University of Michigan

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Introduction

In the spring of 1978, the second phase of an integrated data base system providing on-line services to Purchasing and Accounts Payable was implemented at The University of Michigan. The development of this system was a joint effort by users and personnel from the Office of Administrative Systems. The system was designed to use on-line IMS transactions for data entry and inquiry and IMS batch reporting programs. The system maintains records for approximately 100,000 purchase orders, 20,000 vendors, and issues payments in excess of \$70 million per year.

The University

The University of Michigan is a state supported institution composed of three campuses throughout the state, offering bachelors, masters, Ph.D., and professional degrees in a variety of academic disciplines. Michigan has a total enrollment of some 46,000 students, employs 14,300 staff members, and has an annual operating budget exceeding \$500 million.

Office of Administrative Systems

The Office of Administrative Systems is responsible for the development of The University of Michigan's management information system. Each project identified for systems development is assigned a team of user and systems personnel to plan, design, and implement the system. There are three main development areas: student, personnel, and financial systems. To insure orderly development, the project management procedure requires design documents at specific intervals, audit review of security and controls, and management approval for the commitment of resources.

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Purchasing and Accounts Payable Departments

The Purchasing Department assists the University community in the procurement of supplies, equipment, and services in a manner which provides for the essential accountability of University expenditures. The Purchasing Department has four offices on the Ann Arbor campus.

The Accounts Payable Department has the responsibility for auditing invoices against purchase orders and, with the consent of the department, payment of vendors. Michigan has two Accounts Payable offices.

Description of Old System and Problems

After identifying the need for a particular commodity, a University department completed a requisition form and sent it to Purchasing. Purchasing would assign the requisition to a buyer specializing in that commodity, and the buyer would determine the appropriate source and the price. A nine-part purchase order form was typed and distributed.

Upon receipt of an invoice, Purchasing prepared a voucher approval form which was sent to the department for signature approval on every invoice, regardless of amount. When the department signed the form, they would return it to Accounts Payable, where the invoice would be audited against a copy of the purchase order and a check issued to the vendor.

Numerous problems and inadequacies were inherent in the old system. Some of the overriding factors leading to a system feasibility study were:

- the large number of purchase orders (over 100,000 per year)
- the large volume of invoices (over 200,000 per year)
- a totally manual filing system
- a large percentage of one-time purchase orders
- the difficulty in identifying commodities to be combined into contracts, placed into inventory, or directed to specialists for more efficient handling
- the decentralization of four Purchasing offices and two Accounts Payable offices with a duplication in clerical support and filing systems

- The problems faced by a user department trying to determine the status of their requisition
- redundant and unnecessarily detailed steps for payment approval which resulted in an average pay period of 50 days, poor vendor relations, and lost cash discounts

New System Description

Upon receipt at a Purchasing office, a requisition is logged onto the system using the requisition number as the key. Requisitions not logged on when received are automatically placed on the requisition data base at the time the purchase order data is entered. A department inquiring about their requisition can be told by any Purchasing office the exact status of their requisition ("out to bid", "with buyer", "converted to an order", etc). The requisition is then sent to the buyer handling the particular commodity requisitioned.

A department may request a confirming order number by telephone. A buyer requests certain information from the caller, gives an order number to the caller, and sends a confirming order number assignment form to data entry. This data is entered onto the purchase order data base as a partial purchase order. If, after two weeks, a signed requisition is not received for the pre-assigned order number, a follow-up notice is sent to the department. A second notice is issued two weeks later if there is still no requisition for that order number. After the second notice is sent, the order appears on a listing for telephone follow-up by Purchasing personnel.

Upon receipt of a requisition, the buyer reviews it for completeness, applies various codes, dates, prices and approvals. It is then sent to data entry for expense class, shipping address, commodity, and vendor coding.

Requisitions are batched into two types of batches for data entry - regular and confirming. A batch of regular orders will have the order number assigned by the system as the order is entered. Confirming orders, on the other hand, do not have the order number assigned by the system at the time of entry because the buyer has previously given an order number to the department and/or the vendor. For confirming orders, the operator enters the order number.

All requisition forms batched and entered during the day are held overnight. Purchase orders are printed at the Data Systems Center every night and delivered to Purchasing the next business day. A batch total and error report is used to verify batch entry totals, correct errors, and locate orders requiring special handling. The vendor copy of the order is folded, stuffed, and mailed to the vendor in a window envelope. Departmental copies are sent to the accounting statement recipient using a campus mail window envelope.

If a department or a vendor wishes to change an order, they contact the Purchasing Traffic department. Traffic authorizes the change and updates the data base. At the time of change, traffic has the option of requesting a reprint of the entire order, a printed amendment showing only those fields changed, or no copy at all.

Invoices are received directly by Accounts Payable. They are batched into two categories - under \$1000, or \$1000 and over. Those under \$1,000 are called negative approval batches. They are audited and sent to the department with a notice stating they will be paid in 5 days unless the department contacts Accounts Payable to stop or delay payment. Positive approval batches, \$1,000 and over, are also sent to departments for approval, but they require a signature for payment authorization. Positive approval invoices not returned in a reasonable period of time can be automatically followed up.

Two mailing labels are printed for each invoice that is successfully audited. One is affixed to the notice which encloses a copy of the invoice, and the other is placed on the original invoice which remains in Accounts Payable.

Credit memos are received, batched, and entered by Purchasing. They are then sent to Accounts Payable for batch balancing. Credit memos are automatically applied when the amount of the invoices for a particular vendor exceed the amount of the credit memo.

Once a week, approved invoices are "unloaded" from the accounts payable queue data base. Accounts Payable receives a listing of invoices to be paid, and uses that listing to pull invoices for transfer to Checkwriting.

Checkwriting runs once a week, the day following the accounts payable queue unload. The checkwriting program updates the purchase order data base with payment information and closes orders.

Once a month, a program is run to purge the data bases, removing all orders closed for at least 60 days. Purged orders are put onto microfiche, and an on-line index is available to reference the purge date and microfiche frame number for all purged purchase orders.

Implementation

The first Purchasing office was implemented in January 1978. After three months of operation, the system was expanded to include the remaining offices.

Fiscal year blanket and contract order renewals are processed in May and June, and the system was in place in time to handle them. The high volume of requisitions, coupled with the implementation of a major new system, created a requisition backlog of nearly four weeks in the data entry section. To overcome this problem, it was necessary to borrow several additional terminals, hire temporary employees, and schedule overtime. Within one month, the situation was under control.

By late summer, Accounts Payable was beginning to feel the full impact of the new system. Designed to speed up vendor payments, the system was instead slowing them down. By fall, the situation was becoming critical. Procedural changes, overtime, temporary personnel, and additional terminals were necessary to overcome implementation problems.

Conclusion

With the implementation of the system, the purchasing/payables process at Michigan is fully automated. Departmental and vendor inquiries are answered more quickly and with greater accuracy. Invoices are paid more promptly, adding to vendor confidence in the University of Michigan. Prompter payments have resulted in an increase of cash discounts available. There is more rigorous control and application of credit memos on a University wide basis. The accumulation of statistical data has provided management the tools necessary to direct the efforts and measure results in Purchasing and Accounts Payable. Duplicate files have been eliminated, and clerical effort has been substantially reduced. The security and controls built into the system have made unauthorized purchases and payments much more difficult.

Development of Phases III and IV of the Purchasing system is now underway. Phase III concentrates on management oriented reports for the control and analysis of Purchasing activity. Phase IV is comprised of enhancements to the basic system and will include an interface with the stores/receiving function, small order processing, and commodity code analysis.

Data Base and File Descriptions

1. Purchase Order Data Base

The purchase order data base contains a record for every outstanding purchase order and for those orders closed within the last two months. The purchase order records are established initially from the purchase requisition and updated with acknowledgement, follow-up, and invoice information. The file is available for on-line inquiry by Purchasing, Accounts Payable, and Checkwriting.

2. Vendor Data Base

The vendor data base contains a record for all vendors with outstanding orders. The vendor name, order and remit-to addresses, invoice and credit memo information, standard terms, and FOB are the primary data elements recorded. In addition, the purchase order number, order date, and account number for all outstanding purchase orders and for those orders closed within the last two months are also part of this file. This file is available for on-line inquiry by Purchasing, Accounts Payable, and Checkwriting.

3. Vendor Name Data Base

The vendor name data base is used for inquiry by vendor name. It contains records for the vendor's ordering name, remit-to name and cross reference names. This permits a maximum of four name variations to reference the same vendor number. Records are established and deleted on this file when vendor names are added, changed, or deleted. It is available for on-line inquiry by Purchasing, Accounts Payable, and Checkwriting.

4. Requisition Data Base

The requisition data base contains a record for every requisition entered. Prior to the creation of an order from the requisition, the status of the requisition is available for inquiry. After an order is typed, it is accessible using the requisition number. Records are deleted from this file as the orders are purged. This file is available for on-line inquiry by Purchasing, Accounts Payable, and Checkwriting.

5. Accounts Payable Queue Data Base

The accounts payable queue data base is a perpetual data base containing invoice payment details grouped by batches. Records are established during invoice audit. As invoices are paid, the batches are purged. It is available for on-line inquiry by Accounts Payable and Checkwriting.

6. Print Queue Data Base

The print queue data base is a holding file of daily activity. It contains records indicating which orders, amendments, reprints, and vendor activity reports are to be printed. It is updated as orders, amendments, print requests, and vendors are entered. It is purged as the items specified are printed.

7. Table Data Base

The table data base is a series of table records which contain an assortment of Purchasing information (buyer initials, authorized entry operators, ship-to-codes, complaint types, etc.). This file is updated by the Purchasing system control LTERM or Accounts Payable control LTERM. It is available for inquiry by Purchasing, Accounts Payable, and Checkwriting.

8. Microfiche History Index Data Base

This data base is updated as purchase orders are purged. It contains a root segment for every purged purchase order. A lower level segment contains the purge date, microfiche page, and frame. This provides an index by purchase order number to the microfiche reports produced at purge time.

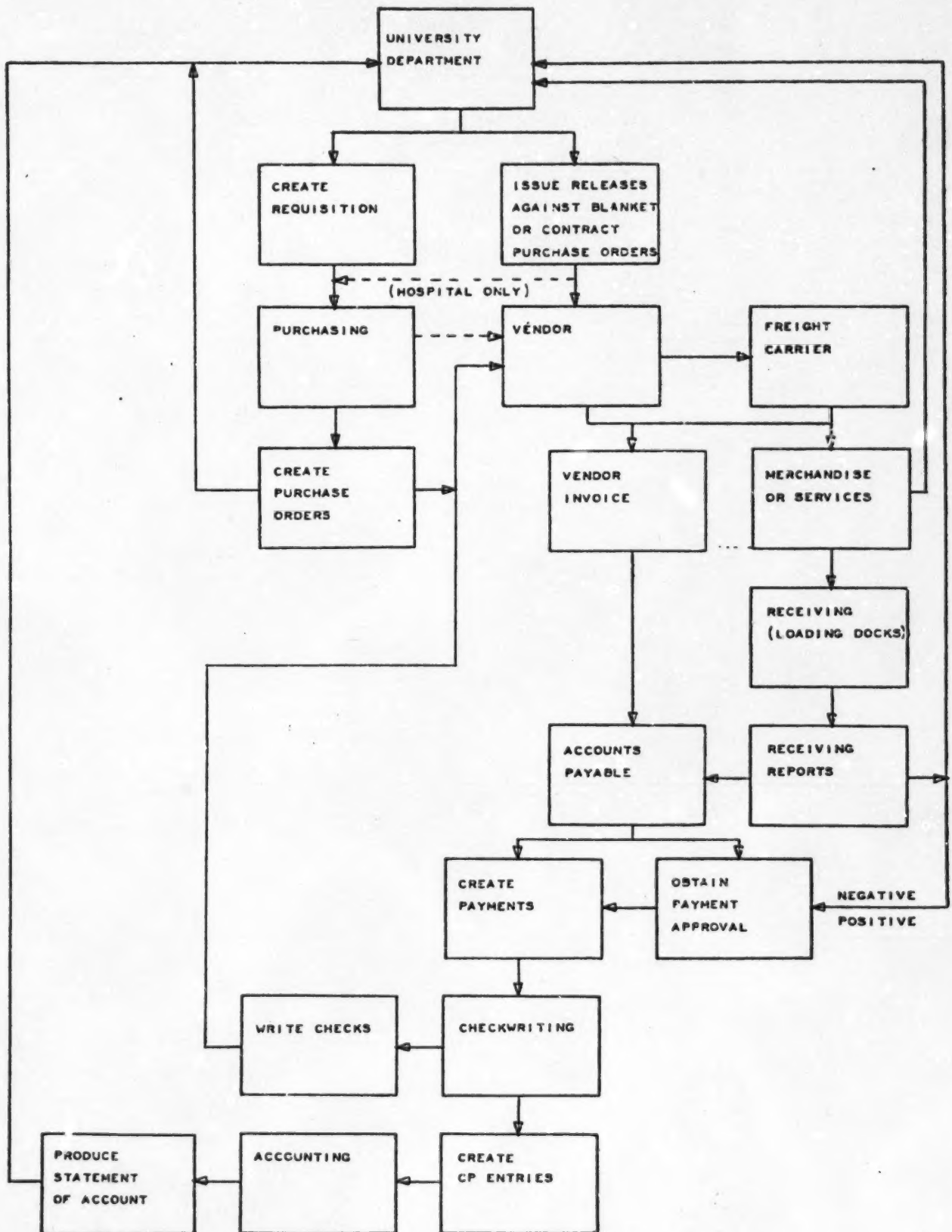
9. Vendor History File

This file is updated as orders are purged. It is a cumulative file containing one record for each purged purchase order. The vendor name and number is included in this record. This file can be sorted by vendor name and a report printed to serve as a cross reference by vendor name to purged purchase orders.

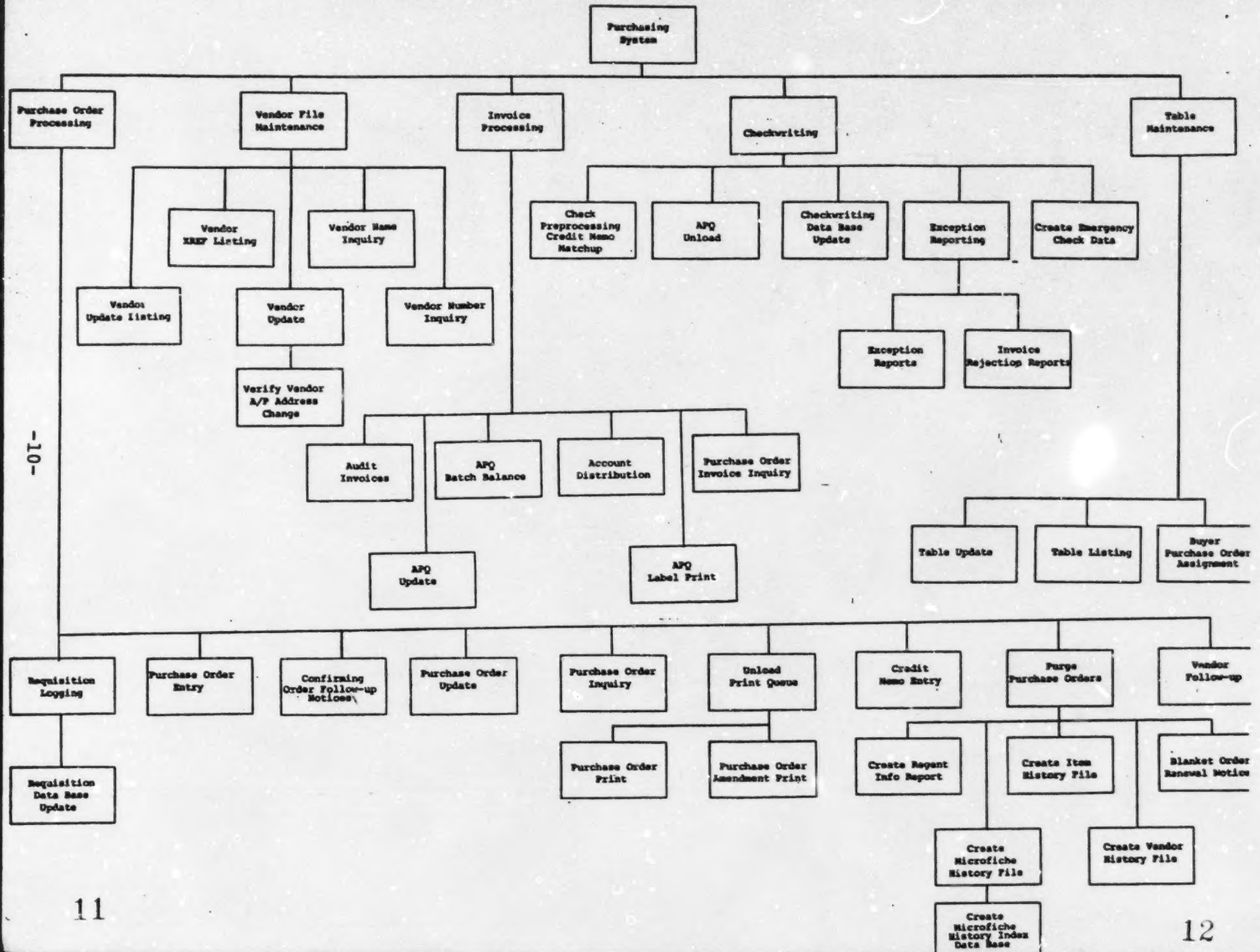
10. Item History File

This file is updated as orders are purged and is a cumulative file. It contains a header record and one record for each line item of a purged purchase order. This file will be used for reporting and analysis in subsequent phases of the Purchasing project.

OF THE PURCHASING/ACCOUNTS PAYABLE SYSTEM



PURCHASING SYSTEM HIERARCHIAL CHART



Program Descriptions

<u>Program Name</u>	<u>Description</u>
PO Inquiry	on-line inquiry by PO number for PO data
PO REQ Inquiry	on-line inquiry by requisition number for PO data
VENNAME Inquiry	on-line inquiry by vendor name to find vendor number
VENINQ Inquiry	on-line inquiry by vendor number to see vendor data and index of PO's written to that vendor
POINV Inquiry	on-line inquiry by PO number to see internal PO data and invoice/payment summary
POINV, INV = Inquiry	on-line inquiry by PO and invoice number for detail payment information on a specific invoice
PO Entry	on-line program to enter purchase order data
PO Amendment	on-line program to update PO data
Vendor Update	on-line program to add or change vendor data
Buyer PO Number	on-line program to assign confirming order numbers to buyers
Credit Memo Update	on-line program to add and change credit memo data
Requisition Update	on-line program to add, change, or delete requisition data
Purchasing Tables	on-line program to add, change, delete, and inquire on table data base data
A/P Audit	on-line program to audit invoices
A/P Batch Balance	on-line program to balance batches of audited invoices

<u>Program Name</u>	<u>Description</u>
A/P Label	on-line program to print mailing labels for audited invoices
Account Distribution	on-line program to distribute an invoice payment across multiple accounts and/or expense classes
Verify	on-line program to verify vendor payment address changes
A/P Queue Update	on-line program to update invoice data for balanced batches
PO Print	batch program to print purchase orders and daily control totals
Amendment Print	batch program to print amended purchase orders and control totals
Vendor Activity Report	batch program to print daily audit trail of changes to the vendor data base
Purge	batch program that passes data bases monthly, removing closed orders, creating an historical data file, a microfiche, and an index of purged orders
Vendor Follow-up	batch program that prints follow-up notices to vendors for orders not received
Confirming Order Follow-up	batch program that prints notices to departments requesting requisitions for order numbers assigned in advance
Checkwriting Unload	batch program that removes invoice data from the accounts payable queue data base for checkwriting
Check Print	batch program to print vendor checks
Check Update	batch program that updates PO data with payment information and closes paid orders

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Program Name

Description

Vendor List

batch program to print master
listing of vendor data base

Buyer/Vendor List

batch program to print selected
vendors for an individual buyer